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25X1A The Files, [redacted] - Schedule "C" 21 August 1956

25X1A9a [redacted]

Conference Report

1. On Wednesday, 15 August 1956, a conference was held in the office of the Chief, Engineering Division, OC with a representative from the 25X1A5a1 [redacted] for technical discussions in connection with 25X1A [redacted], Schedule C. Those present at the conference were as follows:

25X1A9a [redacted] OC-E
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OC-E

[redacted] 25X1A5a1

25X1A5a1 The conference was opened with a discussion of the present scheduling of the QC project. [redacted] indicated that scheduling calls for himself and one part time engineer at present and the addition of one engineer after returning from vacation. No one else is available at the present time. The target date for the completion of the first prototype is 1 March 1957. Following this, the contractor expects to make an engineering evaluation of this equipment and complete the remainder of the five deliverable items by 30 June 1957.

25X1A5a1 2. [redacted] requested guidance concerning the amount of development the agency desires in the base station facility for this project, and was advised that in accordance with the contract the existing base station would be refined somewhat and delivered to the Agency in such condition that it would be capable of being transported to the Agency's location and utilized by Agency personnel. This would however be an engineering model. In addition to this, it is understood that a study will be made concerning the feasibility of techniques required for automatic de-modulation and presentation of the intelligence from this system.

25X1A5a1 3. [redacted] outlined two changes in the basic concept of the phase modulation communications approach. The first, a change from the absolute phase technique requiring reference pulses, to a phase comparison technique

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calling for the delay and intregation of previous pulses in the determination of the intelligence, that is the intelligence would be carried by the phase difference between successive pulses rather than the positive phase of any given pulse. In addition to this, the contractor has determined that the use of three phase modulation rather than four is desirable. The original four phase technique required 3 pulses in any one of four positions giving a possibility of 64 combinations. The use of tri-phase requires 3 pulses in any one of 3 positions giving a possibility of 27 combinations. The tri-phase technique allows for less complexity especially in the coder and more efficient use of message capacity. The major advantage of tri-phase is the necessity to place the pulse in one of three rather than one of four sectors therefore giving a wider margin for error. In addition to this, the use of three positions makes the operator readout facility less complex.

4. The discussions which followed were concerned with the comparison of the tri-phase technique proposed for this Agency with the QFM by-phase technique proposed to the U. S. Air Force for a similar piece of equipment. The Air Force requirement differed somewhat from ours in that their requirement was for a long storage life, but a short operating life (in the order of 30 days) and therefore the Air Force equipment is being tailored to this lesser reliability requirement. On the other hand, the Agency equipment requires modular construction and extreme reliability in the absolute minimum of size and weight. Another one of the major reasons for the Agency tri-phase development is the reduction of bandwidth requirements for the high-speed system. The tri-phase system requires bandwidth of 1.5 kilocycles whereas the QFM by-phase technique will require approximately 6 kilocycle bandwidths. In addition to this, the energy per bit for a given reliability is less for the tri-phase system than for the QFM by-phase system and the base station required for reception of the tri-phase technique is less complex. The QFM by-phase technique on the other hand will provide a slightly less complex field unit and have a slightly greater (approximately 10 per cent) message vs time capacity.

5. The coder for the new tri-phase equipment envisaged as an alphabet wheel of the dial type similar to a dial telephone, which records pulses on a single track utilizing a metallic drum. The elimination of the key board, with its many parts, and the use of a single reading and recording head which eliminates the necessity for very critical alignment should make this coder a much less complex and more easily produced item. AT this point, the necessity for equipment, easily designed and capable of production was stressed.

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6. A number of other items including antenna tuning vs the vertical whip antenna; fixed tuned receiver vs tunable receiver, and the capability to change frequencies of the various transmitter channels in the field in addition to these items that were listed as an annex to the proposal were discussed at some length and [redacted] agreed that the contractor would investigate the feasibility of incorperating these items and the possible effect on the program and report these factors to the Agency. In addition, [redacted] agreed to write a letter to the contracting officer outlining the agreements reached between himself and engineering personnel concerning the change of the basic concept of this equipment from quadri-phase to tri-phase modulation.

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OC-E/R&D-EP/WNH:mjr (17 August 1956)

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